



Titre

[E3][td1] Serie N°1
Avec Cor.

Type

Exercices

Ecole

FST Tanger

Classe

MIPCI

Matière

Chimie minérale

Professeur

Année univ

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Travaux dirigés – Module C121 Chimie Organique
Série 1
LES HYDROCARBURES

I. Ecrire les formules semi-développées des composés suivants :

- a). 2,2,4-triméthyl pentane
- b). 2,4,4-triméthyl pent 2-ène
- c). 2-isopropyl 3-méthyl buta 1,3-diène
- d). 1,2-diéthyl cyclopentène
- e). 2-éthyl 3-méthyl hept 1-ène 6-yne
- f). Cyclohepta 1,3,5-triène
- g). 1-vinyl cycloheptène
- h). 3-allyl cyclohexa 1,4-diène
- i). 3-cyclopropyl 5-tertiobutyl nonane
- j). 3-(3-méthyl cyclopentyl) cyclohexène
- k). 3-éthyl 2-méthyl penta 1,4-diène
- l). 3-méthyl but 1-yne
- m). 2-éthyl 7-méthyl octa 1,3,5-triène

II. 1). Soit un hydrocarbure saturé A de masse moléculaire $M = 86 \text{ g/mol}$.

- a). Donner la formule brute moléculaire de A
- b). Ecrire et nommer tous les isomères possibles pour A.

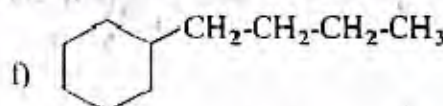
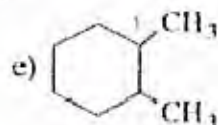
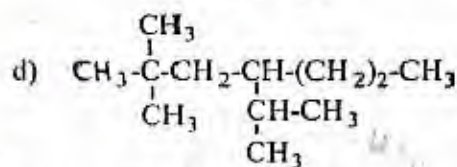
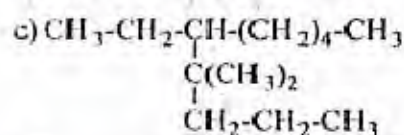
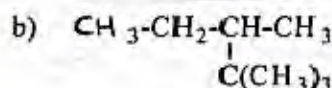
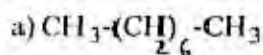
2). Soit un hydrocarbure B de masse moléculaire $M = 56 \text{ g/mol}$.

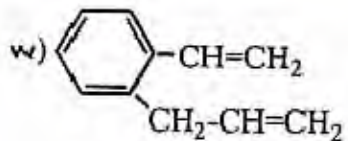
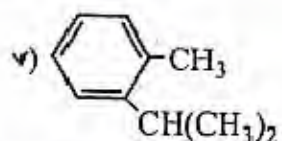
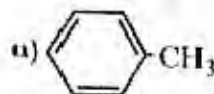
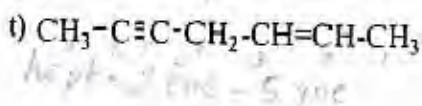
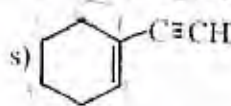
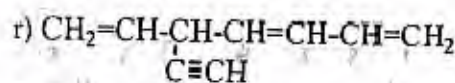
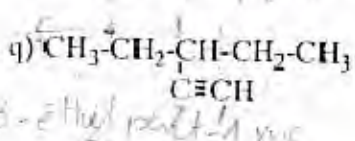
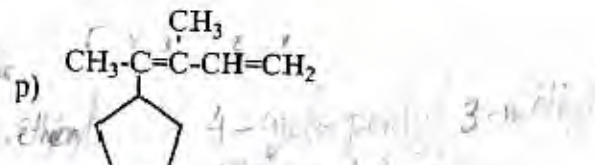
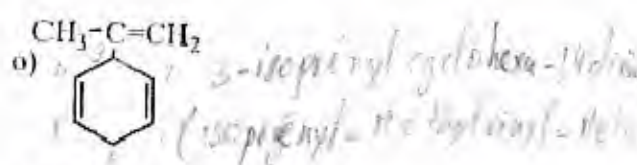
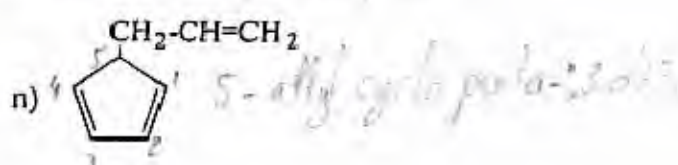
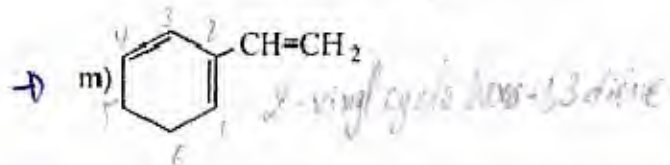
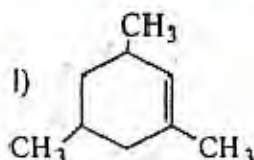
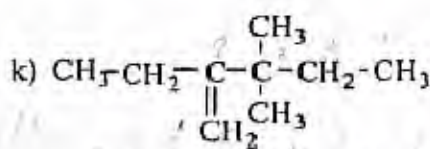
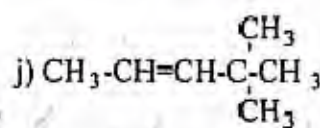
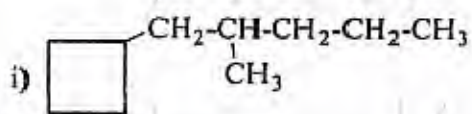
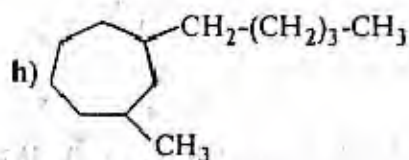
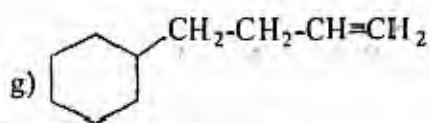
- a). Donner la formule brute moléculaire de B
- b). Ecrire et nommer tous les isomères possibles pour B
- c). Parmi ces isomères, citer 2 isomères de chaîne (de squelette) et 2 isomères de position.

3). L'analyse d'un hydrocarbure D de masse moléculaire $M = 106 \text{ g/mol}$ a montré qu'il contient un cycle benzénique.

- a). Donner la formule brute moléculaire de D
- b). Ecrire et nommer tous les isomères possibles pour D.

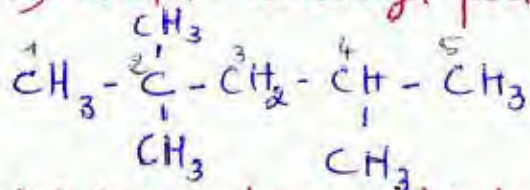
III. Donner le nom systématique selon l'IUPAC des composés suivants :



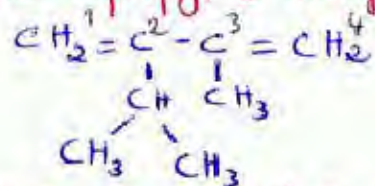


Exercice 1

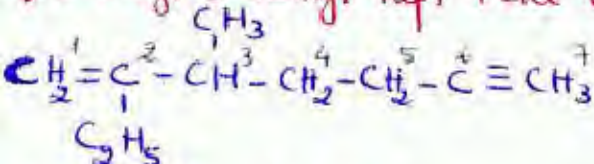
a) 2,2,4-triméthyl pentane



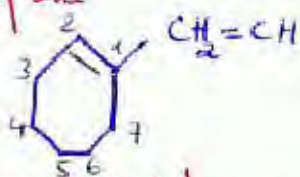
c) 2-isopropyl 3-méthyl buta 1,3-diène



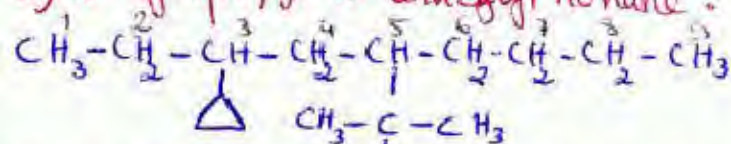
e) 2-éthyl 3-méthyl hept 1-ène 6-yne



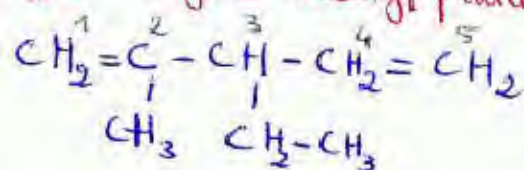
g) 1-vinyl cycloheptène



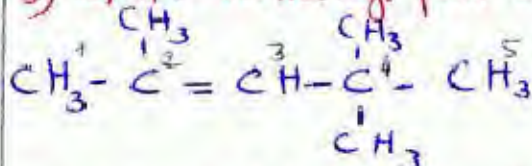
i) 3-cyclopropyl 5-tert-butyl nonane



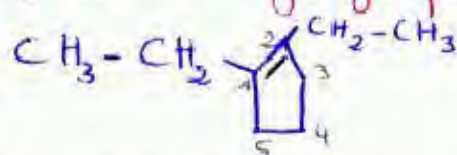
k) 3-éthyl 2-méthyl penta 1,4-diène



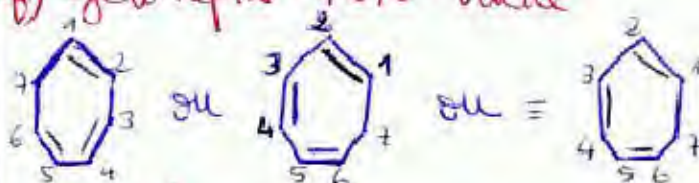
b) 2,4,4-triméthyl pent 2-ène



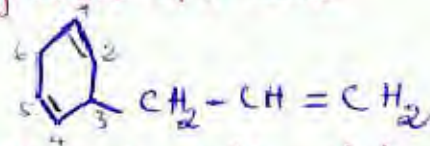
d) 1,2-diéthyl cyclopentène



f) cyclohepta 1,3,5-triène



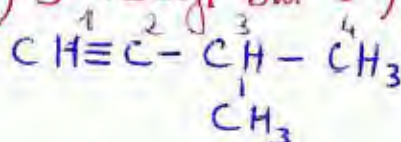
h) 3-éthyl cyclohexa 1,4-diène



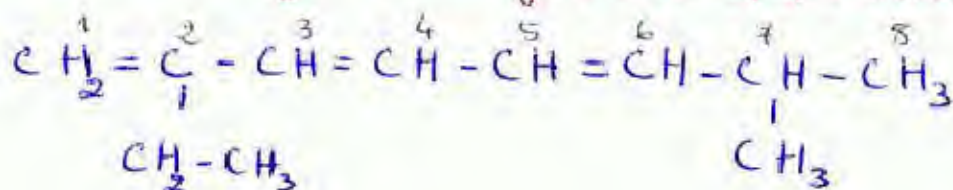
j) 3-(3-méthyl cyclopentyl) cyclohexène



l) 3-méthyl but 1-yne



m) 2-éthyl 7-méthyl octa 1,3,5 triène



Exercice 2

1.a) On a A est un hydrocarbure saturé.
D'où il est un alcane.

alors la formule brute est $C_n H_{2n+2}$.

- avec : $M(A) = 86 \text{ g/mol}$.

$$\text{et } M(A) = n M(C) + (2n+2) M(H)$$

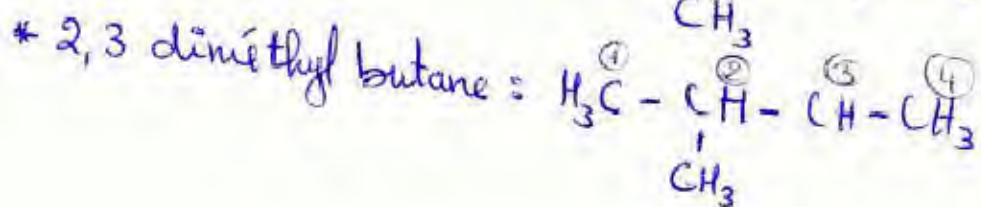
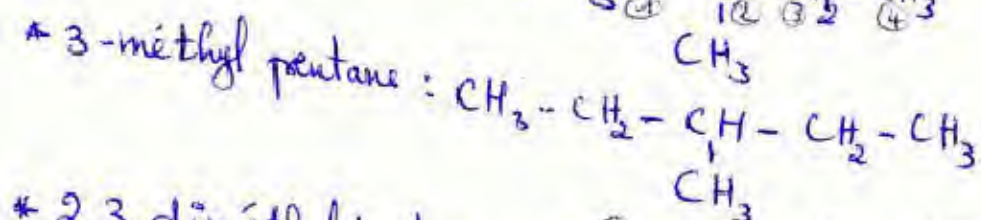
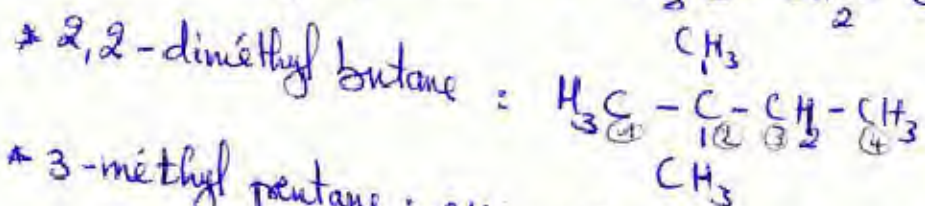
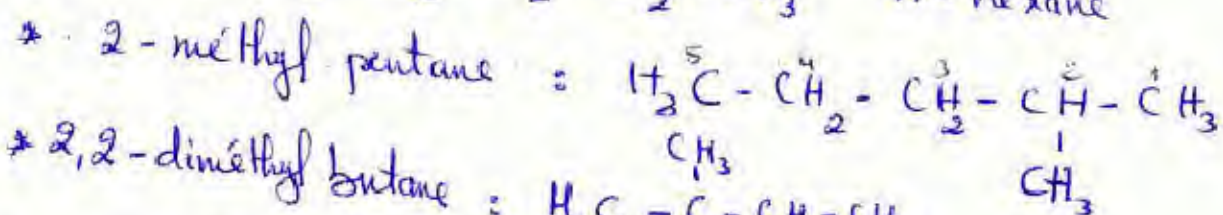
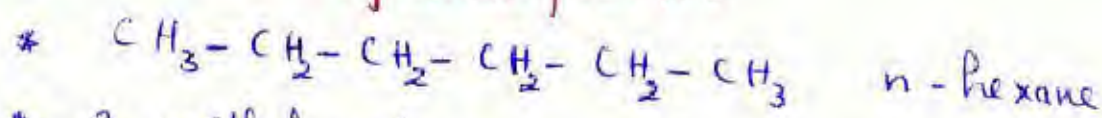
$$* M(C) = 12 \text{ g/mol} \text{ et } M(H) = 1 \text{ g/mol}$$

$$\text{Donc } 12n + (2n+2) = 86$$

$$\Rightarrow 14n + 2 = 86 \Rightarrow n = 6$$

$$\text{alors } C_n H_{2n+2} \rightarrow C_6 H_{14} \text{ (hexane)}$$

b) Les isomères possibles pour A :



➤ Suite l'exercice 2 (TD n°1)

2) a: Composé B ($C_x H_y$)

- on suppose que B est un Alcane : $C_n H_{2n+2}$

$$12n + (2n+2) = 56$$

$$14n + 2 = 56 \Rightarrow n = \frac{54}{14} = 3,8 \text{ (ce n'est pas un alcane).}$$

- on suppose que B est un Alcène : $C_n H_{2n}$

$$14n = 56 \Rightarrow n = 4 ; \text{ La formule est } C_4 H_8$$

b) Les isomères possibles :

1) * $CH_2 = CH - CH_2 - CH_3$: but 1-ène

2) * $CH_3 - CH = CH - CH_3$: but 2-ène

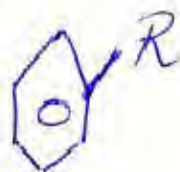
3) * \square : cyclobutane

4) * $\triangle CH_3$: méthyl cyclopropane

5) * $CH_2 = \underset{\substack{| \\ CH_3}}{C} - CH_3$: 2-méthyl propène

c) 1 et 2 sont des isomères de position
1 et 3 sont des isomères des chaînes

3) a: $M(D) = 106 \text{ g/mol}$



$$C_6 H_5 ; M(C_6 H_5) = 77 \text{ g/mol}$$

$$\Rightarrow M(R) = 106 - 77 = 29 \text{ g/mol}$$

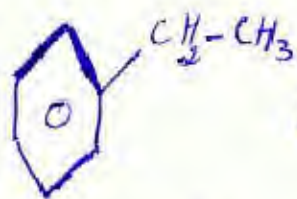
$$* \text{ Si } x = 2 \Rightarrow y = 5$$

$$\text{d'où } C_x H_y = C_2 H_5$$

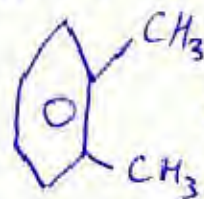
b) Pour écrire les formules brutes développées, on doit calculer le nombre d'insaturation

$$C_x H_y : \kappa + 1 - y/2 ; \Delta = 8 + 1 - \frac{10}{2} = 4$$

Les 4 insaturations est le cycle benzénique.



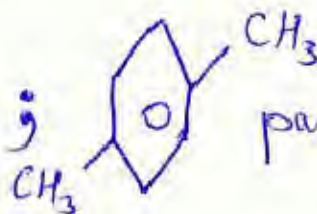
Ethyl benzène ;



ortho-diméthyl benzène

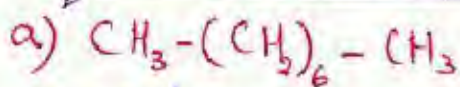


meta-diméthyl benzène ;

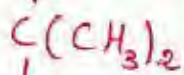
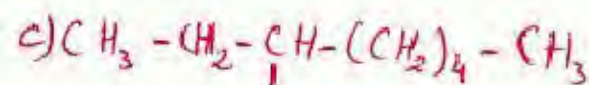


para-diméthyl benzène.

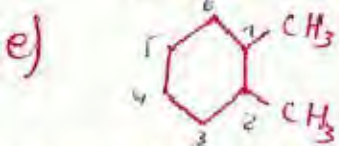
➤ Exercice 38



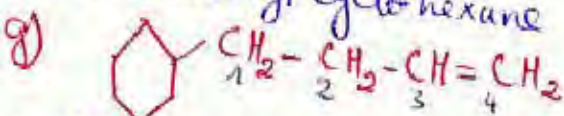
n-octane



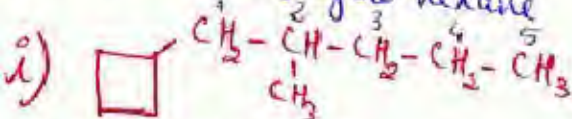
5-éthyl 4,4-diméthyl décane



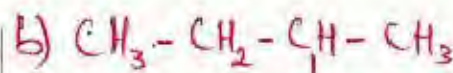
1,2 diméthyl cyclohexane



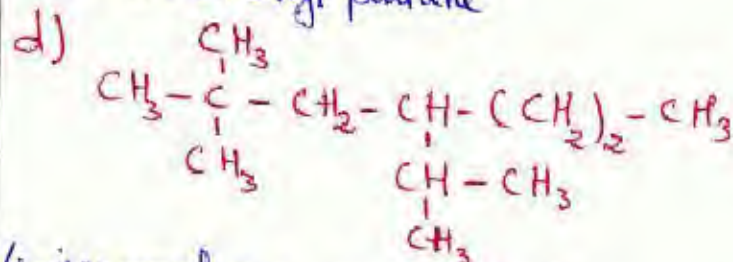
1-(but 4-ène) cyclohexane



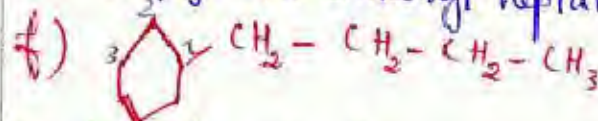
1(2-méthyl)pentyl cyclobutane



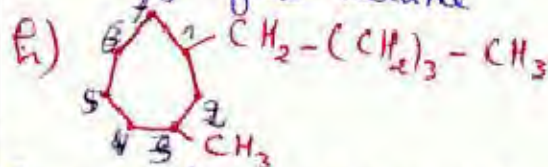
2,2-3 triméthyl pentane



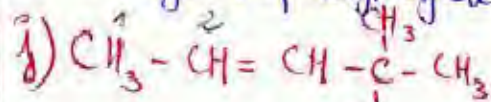
4-isopropyl 2,2 diméthyl heptane



n-butyl cyclohexane

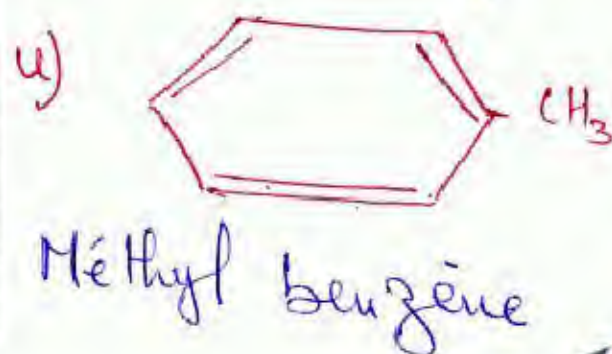
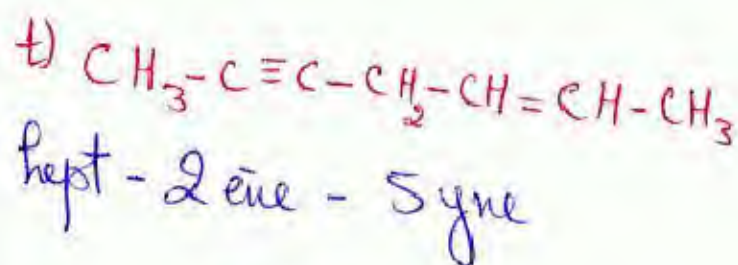
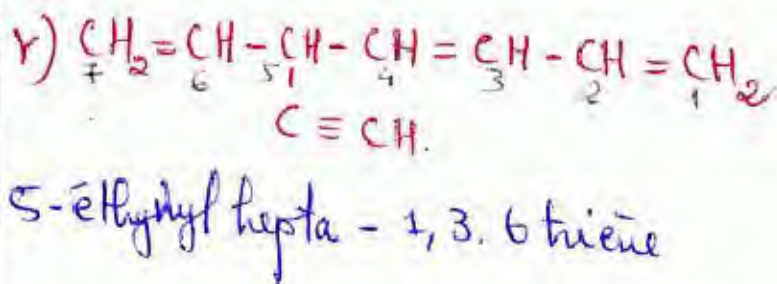
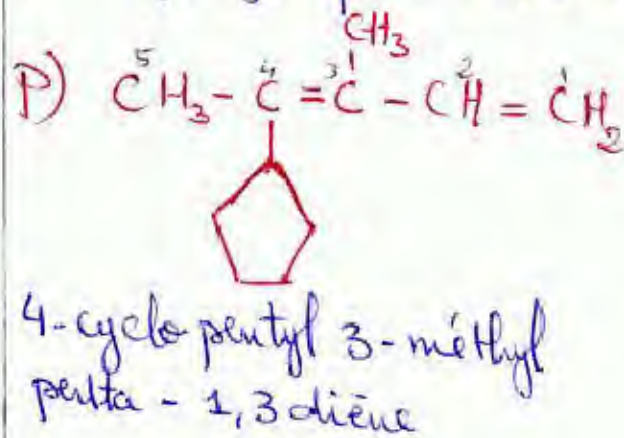
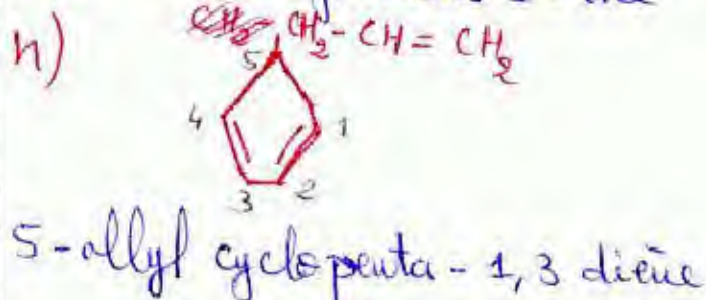
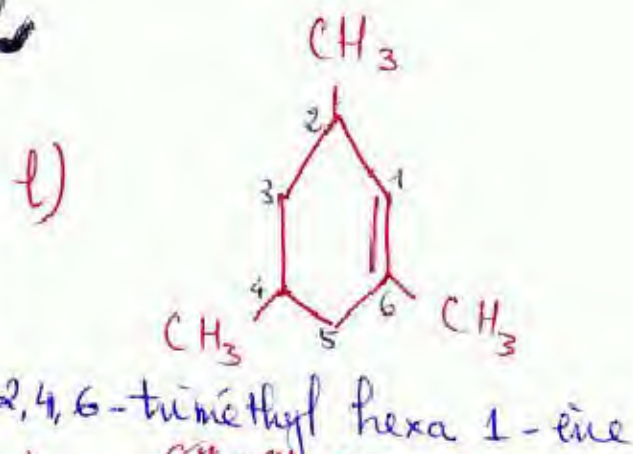
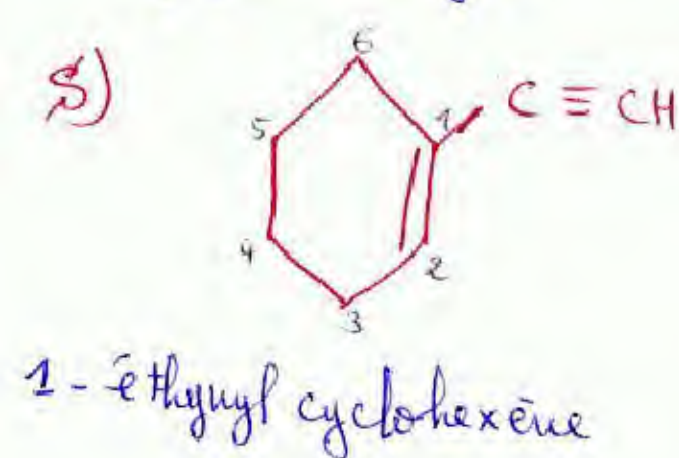
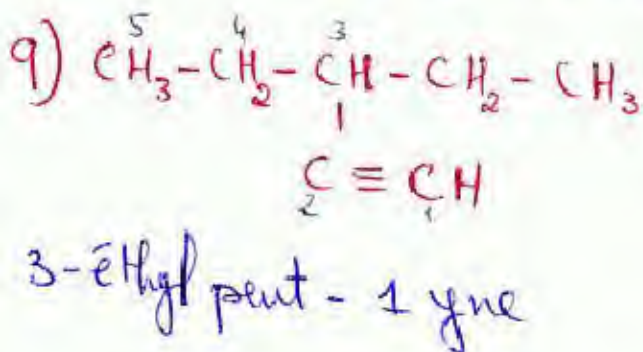
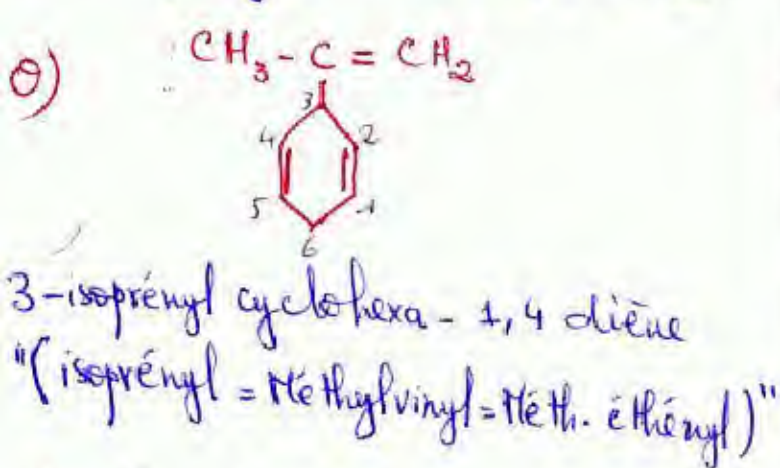
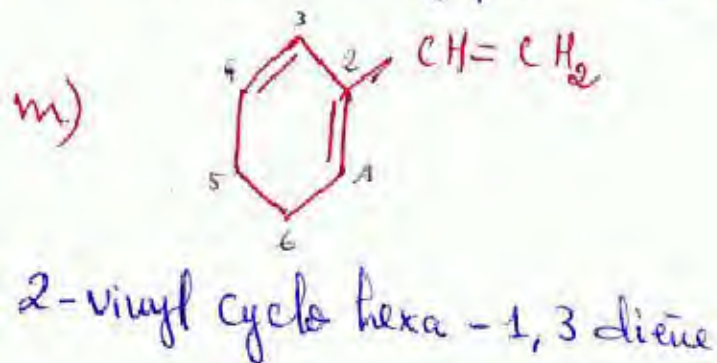
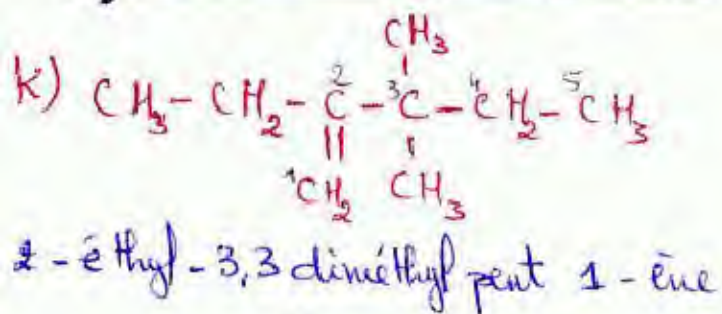


3-méthyl 1-pentyl cycloheptane

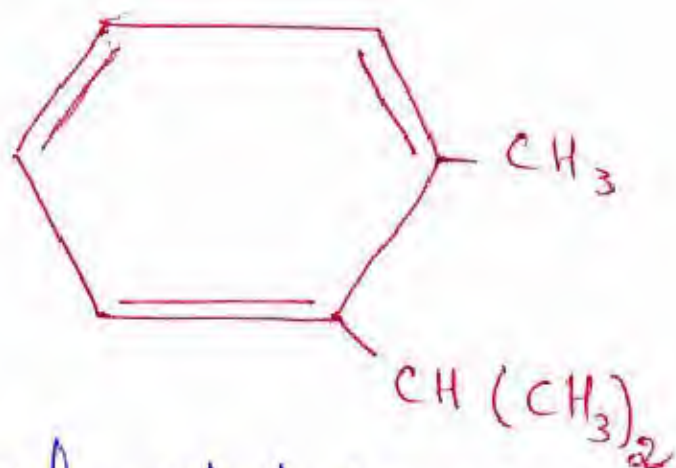


4,4-diméthyl pent 2-ène

➤ Suite d'exercices 3 (TD n° 1)

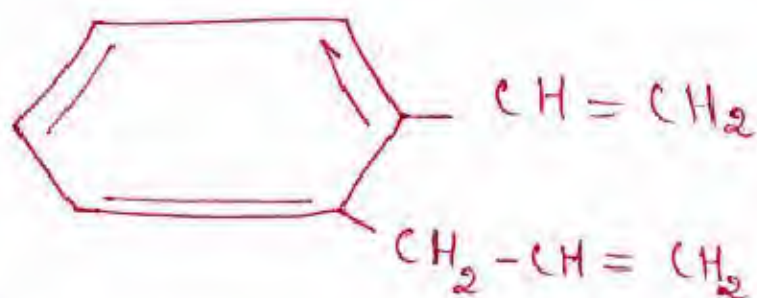


v)



o-isopropyl methyl benzène

W)



o-allyl vinyl benzène

A handwritten signature in blue ink.